

FURTHER STUDIES ON AUSTRALIAN KALLYMENIACEAE (RHODOPHYTA)

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Summary

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Further collections since the monograph of Womersley & Norris (1971) extend the range of *Kallymenia cribrogloea* into N.S.W., clarify the structure and relationships of *K. rosea* and *K. polycœlioides*, and show that *Cirrularcarpus australis* and *Meredithia nana* are one species now known as *Cirrularcarpus nana* (J.Ag.) comb. nov. *Callophyllis coccinea* is now referred to as *C. rangiferinus* (Turner) comb. nov.

Introduction

Since the monograph of Womersley & Norris (1971) on Australian Kallymeniaceae, further SCUBA collections by S. A. Shepherd from New South Wales and Tasmania have provided material permitting clarification of some doubtful species, and an earlier name for *Callophyllis coccinea* is evident.

1. *Kallymenia cribrogloea* Womersley & Norris 1971: 7, figs. 6-12, 78-80.

The range of this species was previously given as from Waldegrave I., Eyre Peninsula, S. Aust. to Port Phillip Heads, Vic. and Bruny I., Tas. Well developed, typical specimens have been found in Jervis Bay, N.S.W., 18 m deep in the southern end of the bay (Shepherd, 15.viii.1972; ADU, A42614). This extends the range considerably, and SCUBA collections from deep water may show that this is not an uncommon species, though rarely found in the drift because of its delicate nature.

2. *Kallymenia rosea* Womersley & Norris 1971: 9, figs. 13-18, 81, 82.

This species was described largely on numerous specimens of Lucas from N.S.W. (mainly in NSW and MEL), collected before 1912; the only other record was one specimen from Port Stephens, N.S.W., in ADU.

The range of *K. rosea* can now be extended to Jervis Bay in southern N.S.W. where it was found 18 m deep in the southern end of the

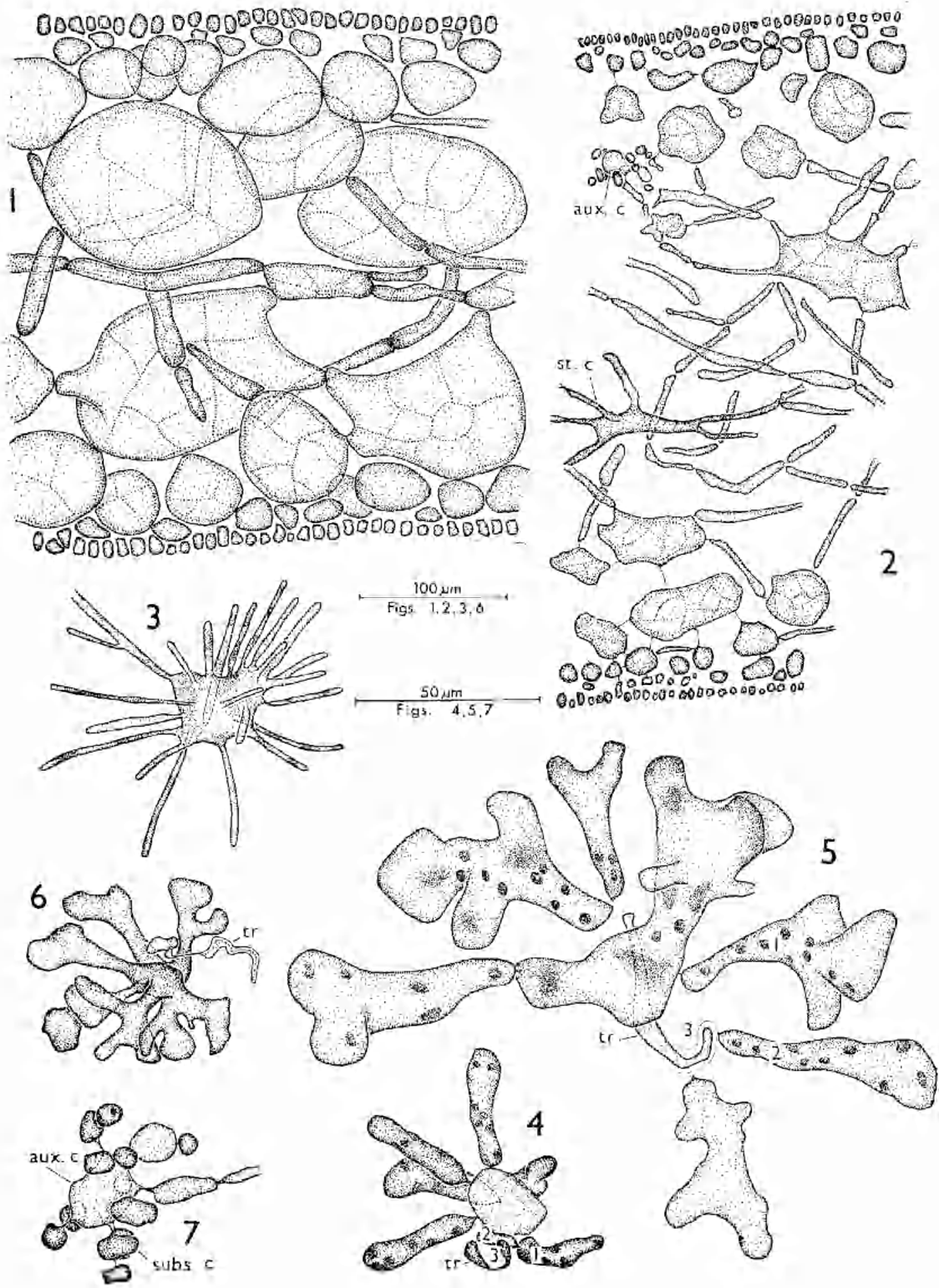
bay, in sheltered situations (Shepherd, 15.viii.1972; ADU, A42615).

This material (4 specimens) agrees well in form with the Lucas plants but is without surface proliferations and is medium red in colour. It is slightly rubbery when fresh and fairly thin. The thallus of liquid preserved specimens is (150-) 250-300 μ m thick (rather more than previously estimated from dried material) and has an epidermis of fairly compact cells grading rapidly to large, thin walled, ovoid, inner cells with large intercellular spaces (especially in the centre of the thallus); fairly loose, moderately coarse, filaments are produced from the larger cells (Fig. 1). Some of the large cells become stellate, as previously figured (Womersley & Norris 1971, fig. 14).

Carpogonial branch systems are polycarpogonial with 8-16 carpogonial branches, the first cell of which is clavate to lobed, and the second cell smaller and elongate; auxiliary cell systems are as previously described and figured, but the large, ovoid, cell recorded as associated with the carpogonial branch systems was not apparent in the Jervis Bay material. Apparently this cell is only a vegetative cell appearing somewhat distinctive in the Lucas specimens. Apart from young fusion cells, stages of carposporophyte development were not present in the Jervis Bay material.

K. rosea is probably a fairly deep water species and is distinct from other Australian species of *Kallymenia* in its form, and from

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other similar foliose species in the presence of polycarpogonial reproductive systems.

3. *Kallymenia polycœlioides* J. Agardh 1876: 687.

Meredithia polycœlioides (J.Ag.) J. Agardh 1892: 76; Womersley & Norris 1971: 42, fig. 108.

Thallus complanate, foliose-subdichotomous, to 12 cm high, arising from a short stipe 1–4 mm long with a discoid holdfast 1–3 mm across; thallus cuneately to broadly expanded to 1–4 cm across at a few cm above the stipe, developing subdichotomous branches 1–1½ cm broad, and 1–2 cm between dichotomies, with broad, rounded apices or lobes 3–6 mm across; in some plants new subdichotomous lobes arise proliferously from older basal parts. Colour deep red to brownish-red, substance fairly soft, adhering closely to paper on drying.

Thallus 400–600 µm thick (Fig. 2), with a cortex 5–7 cells thick and a broad medulla of fairly loosely arranged filaments mostly 7–15 µm in diam.; outer cortical cells fairly compact, 2–4 µm across and isodiametric in surface view, inner cortical cells large; medulla with stellate cells (Fig. 3) often with numerous arms and slightly to moderately staining.

Carpogonial branch systems (Figs. 4, 5) monocarpogonial, the supporting cell lobed and bearing usually 4 lobed subsidiary cells and a 3 celled carpogonial branch, the first cell of which is lobed and the second elongate. Fusion cell lobed (Fig. 6). Auxiliary cell systems (Fig. 7) relatively small, 25–50 µm across, consisting of an auxiliary cell bearing about 8 subspherical subsidiary cells each of which often bears one further cell. Cystocarps scattered, about 2 mm in diam. (in the type).

Male and tetrasporangial thalli unknown.

Type Locality.—Orford, Tas. (*Meredith*).

Type.—Herb. Agardh, LD (24843).

Distribution.—South-eastern Tasmania. As well as the type, two further Tasmanian collections are known—Fluted Cape, Bruny I, 23 m (*Shepherd*, 12.ii.1972; ADU, A41925), and Great Taylor Bay, Bruny I, 2–5 m (*Shepherd*, 14.ii.1972; ADU, A42131).

Previously this species was considered of uncertain status (Womersley & Norris 1971, p. 42) but two collections by S.A. Shepherd from near the type locality, and agreeing very well in form with the type, show typical kallymeniaceous female reproductive systems.

K. polycœlioides differs from other Australian species of the genus (see Womersley & Norris 1971, p. 4) in its subdichotomous habit, and is most closely related to *K. rubra* Womersley & Norris in its structure and reproduction.

K. polycœlioides agrees well with *Kallymenia* in thallus structure and in reproduction, but differs from most other species in being broadly subdichotomous (as in the holotype illustrated by Womersley & Norris 1971, fig. 108) rather than foliose or foliose-lobed. However, Codomier (1971) has referred two Mediterranean species, which show a branched habit, to *Kallymenia*, though without knowledge of the reproduction of either; *K. patens* (J.Ag.) Codomier becomes subdichotomous several times, while *K. spathulata* (J.Ag.) Codomier is broadly furcate and lobed above.

K. polycœlioides has a fairly soft thallus, drying thin and closely adherent to paper, and not cartilaginous. The texture, structure and reproduction agree so well with other species of *Kallymenia* that *K. polycœlioides* cannot be separated generically simply on the basis of its habit.

Placement of *K. polycœlioides* in *Kallymenia* involves consideration of the difference between *Kallymenia* and *Cirrulicarpus*. The latter is usually distinguished by its branched thallus. Both the type species of *Cirrulicarpus* [*C. gmelini* (Grunow) Tokida & Masaki] from Japan, and *C. australis* Womersley & Norris (see below) from southern Australia, have thalli with several subdi- to polychotomous branchings. While *K. polycœlioides* and *Cirrulicarpus* both have a branched habit, the thallus texture of the former is soft and not cartilaginous (as is typical of most species of *Kallymenia*), in contrast to the thallus of *Cirrulicarpus* which is cartilaginous, not or only slightly adherent to paper. A possible distinction also lies in the cystocarps which Norris

Fig. 1. *Kallymenia rosea*. Cross section of thallus.

Figs. 2–7. *Kallymenia polycœlioides*. Fig. 2.—Cross sections of thallus with a stellate cell and auxiliary cell system. Fig. 3.—Stellate cell. Fig. 4.—Young carpogonial branch system. Fig. 5.—Mature carpogonial branch system. Fig. 6.—Fusion cell. Fig. 7.—Auxiliary cell system.

Abbreviations used: aux.c, auxiliary cell; st.c, stellate cell; subs.c, subsidiary cell; tr, trichogyne. 1, 2, 3 refer to the first cell, second cell, and carpogonium of the carpogonial branch respectively.

et al. (1960) report as being compound or confluent in *C. gmelini*, and which are grouped in *C. australis*. For the present *Cirrulicarpus* is best maintained as a distinct genus, but further studies of distinctions between it and *Kallymenia* are needed.

4. *Cirrulicarpus australis* and *Meredithia nana*.

Womersley & Norris (1971, p. 42) regarded *Meredithia nana* J. Agardh as of doubtful affinity, commenting that the thallus structure is kallymenioid but reproductive systems were not seen adequately in the type. It was considered that it might not be a member of the Kallymeniaceae.

Further study of plants of *Cirrulicarpus australis* Womersley & Norris, especially of small thalli, show that the type specimen of *Meredithia nana* is almost certainly a young plant of *C. australis*. Their form is comparable taking regard of the state of development, the structure in cross sectional view is identical, and the type locality of *M. nana* (Port Phillip, Vic.) is similar to that of *C. australis* (Port Phillip Heads).

The species should therefore be known as *Cirrulicarpus nana* (J. Agardh) comb. nov. (Basionym *Meredithia nana* J. Agardh 1892, p. 76), with *C. australis* Womersley & Norris (1971, p. 19, figs. 39-43, 90) as a synonym.

5. An earlier name for *Callophyllis coccinea* Harvey.

Since the publication of Womersley & Norris (1971), the type specimen of *Fucus rangiferinus* Turner has been examined. This specimen in the British Museum, from Kents Islands, Bass Strait, was collected by R. Brown (No. 256) in 1803-4, and is a tetrasporangial specimen 4-6 cm high, much branched with slender ultimate branches typical of *Callophyllis coccinea* Harvey.

The correct name is thus *Callophyllis rangiferinus* (Turner) comb. nov. (Basionym *Fucus rangiferinus* Turner 1811, p. 114, pl. 183).

Following the original description of Turner, *F. rangiferinus* was placed under *Chondria* by C. Agardh (1823, p. 359) and under *Hypnea*? by Greville (1830, p. lix) and Kuetzing (1849, p. 761). J. Agardh (1852, p. 636) referred it to *Lecithites*, but later (1876, p. 572) referred his 1851 description to *Mychodea hamata* Harvey, excluding the previous synonyms. De Toni (1897, p. 264) followed J. Agardh.

Acknowledgments

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